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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,555	10/01/2006	Robert Desbrandes		1774

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E-QUANTIC COMMUNICATIONS
1, ALLEE DES CHERINIERS
GIVARLAIS, FR-03190
FRANCE

EXAMINER	
PURINTON, BROOKE J	

ART UNIT	PAPER NUMBER
2881	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,555	DESBRANDES ET AL.	
	Examiner	Art Unit	
	Brooke Purinton	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/01/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 October 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Abstract

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Specification

The disclosure is objected to because of the following informalities:

Paragraph 7 – "Hafnium 179, emit several gamma at the time of their return," should be "gamma rays"

Paragraph 25 – "other 1332 keV with 99,98% chance to occur," should be 99.98%

Paragraph 28 and 29 – "Table off Isotopes," should be "Table of Isotopes"

Paragraph 39 – "in general the accelerators cannot function permanently," examiner thinks this should "cannot function continuously"

Appropriate correction is required.

Claim Objections

Claim 1 is objected to because of the following informalities: line 1 "product consisting in a sample," should probably be "product comprising of a sample" since the transitional phrase "consisting of" excludes any element, step, or ingredient not specified in the claim. In re Gray, 53 F.2d 520, 11 USPQ 255 (CCPA 1931).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Julsgaard et al. ("Experimental long lived entanglement of two macroscopic objects," Nature, 27 September 2001, Vol. 413, Pages 400-404) state that "Entanglement is generated via interaction of the samples with a pulse of light, which performs a non-local Bell measurement on the collective spins of the samples. The entangled spin-state can be maintained for 0.5 milliseconds," (abstract). Since applicants claim in the specification that the length of the entanglement (and therefore the probability dependence) between the two gamma rays lasts much longer "again the normal half-life is reached after 1500 minutes have elapsed and grows then to 400 minutes when the time reaches an elapsed 3000 minutes" (paragraph 40).

One of ordinary skill would not know how to ensure that the entanglement of the gamma rays is long lived enough to experimentally observe the time-varying half life of Figure 5 or 7 in applicants drawings.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Regarding claim 10, the phrase "for example" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP (Manual of Patent Examining Procedure) § 2173.05(d).

Claim 1 recites the limitation "the table of isotopes," in part (b) line 7. There is insufficient antecedent basis for this limitation in the claim.

Claims 12-17 provides for the use of the nuclear isomer of Claim 1, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 12-17 (since 18 is noted as withdrawn on the preliminary amendment) are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vysotskii ("The Problem of Radioactive Particle Beams Transportation and the Experimental Realization of the Phenomenon of Suppressed Gamma Decay of Radioactive Nuclei," Proceedings of the 1999 Particle Accelerator Conference, New York, 1999).

Regarding Claim 1, Vysotskii teaches a product consisting in a sample containing at least one kind of excited isomer nuclides in which at least one said excited isomer nuclide has at least one metastable state that deexcites by emitting gamma rays, called hereafter deexcitation gamma rays (title, "gamma decay of radioactive nuclei"), characterized in that the measurable half-life, called thereafter the "variable" half-life, on at least one said excited isomer nuclide of said "entangled" sample, during its natural deexcitation producing said deexcitation gamma rays, is variable ("for the first time in this experiment we have discovered the change of radiative transmission life-time τ^* by 40-100% and total life-time τ_{tot} * ... by .6-2%," Page 1314, Col 2, paragraph 2).

However, Vysotskii fails to teach that the groups of two or several excited nuclei of the aforesaid excited isomer nuclides of the aforesaid sample, are entangled between them and presenting quantum coupling between some of the excited nuclei of the aforesaid excited isomer nuclides.

Supporting document Cheon ("The modified decay width of the radioactive nucleus," The European Physical Journal A, 33, 213-221 (2007)) discusses the mechanism behind the experiment of Vysotskii.

"The mechanism is that the gamma rays emitted from the radioactive nucleus are readsorbed by the source nucleus after scattering backward by the metallic reflector and then, the nucleus is excited again. Although this process occurs with a very small probability, it is definite and repeats many times before the nuclear half-life is formed," (Page 1, paragraph 4)

Because the mechanism behind the invention of Vysotskii is basically gamma ray emitting from the nuclei isomer, and because it is known in the art that an electron can transition down to a lower level by emitting one or more photons, and that those emitted photons, between them, will also have to conserve spin, that some of the gamma ray photons emitted from the nuclear isomer of Vysotskii's setup will also be quantum entangled. Since these gamma ray photons are then reabsorbed by the nuclear isomer, it would be obvious that some of them would consequently be entangled as well. Therefore, while not explicitly stated, the mechanism would suffice to fill this limitation.

Vysotskii also fails to teach that the initial said "variable" half-life of the aforesaid excited isomer nuclide is lower than the constant half-life of the aforesaid excited isomer nuclide given by the table of isotopes, said constant half-life thereafter being called the theoretical half-life of the said excited isomer nuclide, and the value of the said "variable" half-life of the aforesaid excited isomer nuclide varying from the value of the said initial "variable" half-life to the value of the said theoretical half-life of the aforesaid excited isomer nuclide, then increasing beyond the value of the aforesaid theoretical half-life.

However, using the mechanism that is behind the manipulation of the half life means that it would have been a matter of routine experimentation to one of ordinary skill in the art to further adjust the gamma ray readsorption to either extend or decrease the half life of the nuclear isomer.

Therefore, Claim 1 is either taught, explicitly or implicitly by the paper of Vysotskii and the product that he produces is not patentably distinct from that of Claim 1.

Regarding Claim 2, Vysotskii teaches the product according to claim 1 further characterized in that said "entangled" sample comprises said excited nuclei of at least one kind of said isomer nuclides having at least one said metastable state with a duration of its theoretical half-life from one microsecond to 50 years (SN119, page 1313, Col 1, paragraphs 2-4).

Regarding Claim 3, Vysotskii teaches the product according to claim 1 further characterized in that said "entangled" sample comprises said excited nuclei of at least one kind of said excited isomer nuclides being radioactive isotopes ("radioactive and excited nuclei of several isotopes," Page 1312, Col 1, first paragraph).

Regarding Claim 4, Vysotskii teaches a product according to claim 1 further characterized in that said "entangled" sample, comprising said excited nuclei, is in any physical or any chemical form, for example in the form of solid in sheet or powder, or in the form of fluid or gas (case of Xenon for example), said "entangled" sample containing a proportion of at least one or several aforesaid excited isomer nuclides, for example, Tin (119Sn50m) (SN119, page 1313, Col 1, paragraphs 2-4).

Regarding Claim 5, Vysotskii teaches a product according to claim 1 further characterized in that said "entangled" sample, comprising said excited nuclei, is in the form of alloys, mixtures, or chemical compounds incorporating a proportion of said excited nuclei from one or several of aforesaid excited isomer nuclides (SN119, page 1313, Col 1, paragraphs 2-4, proportion is 100%).

Regarding Claim 6, Vysotskii teaches a product according to claim 1.

He fails to teach that it is characterized in that said "entangled" sample underwent a physical and / or a chemical transformation after its manufacture.

However, it would be obvious to try since any transformation would allow more versatility and application options for the product, therefore, one of ordinary skill would see the benefits and attempt to transform it after manufacture.

Regarding Claim 7, Vysotskii teaches a product according to claim 1 further characterized in that the said initial "variable" half-life of at least one of the aforesaid excited isomer nuclides of the "entangled" sample is strictly lower than the theoretical half-life of the aforesaid excited isomer nuclide, for example ranging between 10% and 90% of the theoretical half-life ("for the first time in this experiment we have discovered the change of radiative transmission life-time τ^* by 40-100% and total life-time τ_{tot} * ... by .6-2%," Page 1314, Col 2, paragraph 2).

Regarding Claim 8, Vysotskii teaches the product according to claim 1 further characterized in that said "entangled" sample contains said excited nuclei from at least two said excited isomer nuclides (since the sample mentioned above has more than one atom).

Regarding Claim 9, Vysotskii teaches the product according to claim 1 further characterized in that said "entangled" sample contains said excited nuclei from at least one excited isomer nuclide in at least two said metastable states (the Sn119 isotopes being bombarded with gamma rays ensures some of them will be in different metastable states).

Regarding Claim 10, Vysotskii teaches a manufacturing process of the product according to claim 1 in which one uses amongst other things at least one kind of said isomer nuclide having at least one said metastable state (Figure 1, part 1).

He fails to explicitly teach the irradiation by gamma rays, characterized in that one prepares a sample containing nuclei of at least one said isomer nuclide having at least one said metastable state, by irradiation by means of gamma rays comprising at least some groups of entangled gamma rays, of a sufficient energy to excite certain of the aforesaid nuclei of the said isomer nuclide in at least one said metastable state, the aforementioned entangled gamma rays being generated, for example, either by a source of gamma rays emitted in a cascade, or by a generator of gamma rays coming from the Bremsstrahlung of accelerated particles, such as electrons, alpha particles, or protons, the aforementioned groups of entangled gamma rays, exciting the aforementioned corresponding nuclei of the aforesaid isomer nuclide distributed in the aforementioned irradiated sample that is produced, qualified in the continuation by convention "entangled" sample.

Supporting document Cheon ("The modified decay width of the radioactive nucleus," The European Physical Journal A, 33, 213-221 (2007)) discusses the mechanism behind the experiment of Vysotskii.

"The mechanism is that the gamma rays emitted from the radioactive nucleus are readsorbed by the source nucleus after scattering backward by the metallic reflector and then, the nucleus is excited again. Although this process occurs with a very small probability, it is definite and repeats many times before the nuclear half-life is formed," (Page 1, paragraph 4)

Because the mechanism behind the invention of Vysotskii is basically gamma ray emitting from the nuclei isomer, and because it is known in the art that an electron can transition down to a lower level by emitting one or more photons, and that those emitted photons, between them, will also have to conserve spin, that some of the gamma ray photons emitted from the nuclear isomer of Vysotskii's setup will also be quantum entangled. Since these gamma ray photons are then reabsorbed by the nuclear isomer, it would be obvious that some of

them would consequently be entangled as well. Therefore, while not explicitly stated, the mechanism would suffice to fill this limitation.

Regarding Claim 11, Vysotskii teaches a method according to claim 10 further characterized in that the said initial "variable" half-life of the obtained aforesaid "entangled" sample varies with the duration of said irradiation and / or with the power of said irradiation (obvious over mechanism discussed by Cheon, where the more radiation (i.e. reflected gamma rays) encountered, the more readsorption probability increases).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Attached please find a search report of Non Patent Literature on the inventive concept of this application.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brooke Purinton whose telephone number is 571.270.5384. The examiner can normally be reached on Monday - Friday 7h30-5h00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571.272.2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brooke Purinton
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